

Application Serial No.: 09/683,496

Attorney Docket No.: 57761.000185

Client Reference: 03GP-8049

REMARKS

Claims 1-15 and 17-47 are pending in the application. By this Amendment, claims 1, 5, 10, 20, 23, 42 and 43 are amended, claim 16 is canceled without prejudice or disclaimer to the subject matter set forth therein, and claim 47 is added. Reconsideration and allowance in view of the foregoing amendments and following remarks are respectfully requested.

No new matter has been added by this Amendment. Support for the amendments to the claims may be found in paragraphs 21, 26, 27, 28, 30 and 31 and in Figs. 1, 2A, 2B and 2C, for example.

Applicant filed a Supplemental Information Disclosure Statement on June 16, 2003. However, an initialed copy of the PTO-1449 was not included with the June 25, 2003 Office Action. Applicant respectfully requests such initialed copy, as was discussed with Examiner Darskovsky on July 25, 2003.

Applicant believes that the application is now in condition for allowance and notice thereof is respectfully requested.

I. THE CLAIMS SATISFY THE REQUIREMENTS OF 35 U.S.C. §112

The Office Action rejects claim 16 under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The Office Action asserts that neither specification nor drawings comprise any explanation about the structure providing the improved cooling efficiency. This rejection is respectfully traversed for the reasons set forth in the June 12, 2003 Response.

However, in order to expedite prosecution of this application, claim 16 has been

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canceled by this Amendment. Accordingly, it is submitted that the claims satisfy all requirements of 35 U.S.C. §112. Withdrawal of the rejection under 35 U.S.C. §112, first paragraph, is respectfully requested.

II. THE CLAIMS DEFINE PATENTABLE SUBJECT MATTER

A. The 35 U.S.C. §102 Rejection based on Gaia

The Office Action rejects claims 1-5, 7-8, 13-14, 18-27, 29, 35 and 39-46 under 35 U.S.C. §102(b) as being unpatentable over U.S. Patent No. 4,375,630 to Gaia. The rejection is respectfully traversed.

Claim 1 recites an apparatus for cooling one or more electrical protective devices mounted to at least one electrical terminal, the apparatus comprising one or more coolant passages being thermally-conductive with at least one electrical terminal, the at least one electrical terminal being in the shape of a plate; and one or more coolant sources, connected to the one or more coolant passages, for passing coolant fluid through the one or more coolant passages, whereby the at least one electrical terminal is cooled; and *at least one of the coolant passages being disposed along and in parallel to the at least one electrical terminal such that a length, of a portion, of the at least one of the coolant passages lies along the electrical terminal that is in the shape of a plate.* Claim 1 has been amended by this Amendment.

The Office Action also rejects claim 41 under 35 U.S.C. §102 as being unpatentable over Gaia. Claim 41 has not been amended by this Amendment. Claim 41 recites a method for cooling a fuse array mounted between two electrical terminals comprising *attaching a pair of coolant passages, each shaped to have two or more roughly parallel lengths, to each of the electrical terminals along the roughly parallel lengths such that the roughly parallel*

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lengths of each of the coolant passages divide each of the electrical terminals into approximately equally sized regions; attaching a column of fuses to each electrical terminal in each of the approximately equally sized regions, thereby interconnecting the electrical terminals; providing coolant fluid; and connecting a plurality of coolant conduits to the pair of coolant passages connecting at least one of the coolant conduits to at least one coolant source for passing the coolant fluid through the coolant conduits and the coolant passages.

The Office Action asserts on page 3 that in Gaia two coolant passages comprising fasteners 12 interconnect and divide terminal bells 14 and fuses 20 into two equally sized regions (two halves of the bells 14 and two pairs of fuses 20). On page 4, the Office Action further asserts that Gaia teaches an apparatus 10, Figs. 1-6, for cooling a fuse array mounted between two electrical terminals comprising two fasteners 12 comprising coolant passages being thermally-conductively attached to each of the electrical terminals 14/16 between fuse columns such that the fasteners 12 comprising the coolant passages divide each of the electrical terminals 14/16 into approximately equally sized zones; and grouping of fuses 20 attached to and disposed respectively intermediate the two electrical terminals 14/16 in each of the approximately equally sized regions. The Office Action further asserts that Gaia teaches that each fuse 20 has opposite longitudinal ends 30 each being mounted to the electrical terminal 14/16; there are two coolant sources (col.3, lines 48-60) connected to the coolant passages 30/36 through non-conductive (plastic) conduits.

These assertions set out in the Office Action are respectfully traversed. It is respectfully submitted that the assertions in the Office Action contain mischaracterizations of the teachings of Gaia. As noted above, the Office Action asserts that Gaia teaches an apparatus 10 for cooling a fuse array mounted between two electrical terminals comprising

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two fasteners 12 comprising coolant passages (30, 36) being thermally-conductive attached to each of the electrical terminals 14/16 between fuse columns such that the fasteners 12 comprising the coolant passages divide each of the electrical terminals 14 into approximately equally sized zones. As discussed below, these assertions are traversed in that the fasteners 12 and the coolant passages of Gaia cannot fairly be said to divide each of the electrical terminals 14 of Gaia into approximately equally sized zones, even if the end bells 14 of Gaia are said to be electrical terminals, as asserted in the Office Action.

In column 2, lines 26-41, Gaia describes that Figs. 1-3 illustrate a multiple element fuse 10 according to the Gaia invention, and that the multiple element fuse 10 comprises a pair of metallic end bells 14 and a plurality of current carrying fusible elements, illustrated as cylindrically shaped tube fuses, each designated by the numeral 20. Gaia explains that the ends of the tube fuses are joined by solder 40 (Fig. 3) to the inside surface 22 of metallic end bells 14. Gaia further teaches that also connected between metallic end bells 14 are a pair of fasteners 12 having the same general dimensions as tube fuses 20.

Gaia further describes in column 3, lines 48-60, that to further enhance the operation of the high capacity multiple element fuse 10 of Gaia, mounting means 30 of fasteners 12 may be provided with a central opening 32. Gaia explains that being tubular, insulating ceramic body 24 of fastener 12 has a central hollow portion 36 and hence can serve as a conduit for the passage of fluid coolant therethrough; and that once fuse 10 is installed, fluid connections may be made to the ends of mounting means 30, such as, for example, by copper or plastic tubing to carry fluid coolant from a remote source to multiple element fuse 10. Gaia teaches that such arrangement and capability is particularly advantageous for very high current capacity fuses which are continuously operated very near their rated capacity.

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Amended claim 1 recites the features of the at least one electrical terminal being in the shape of a plate; and also recites the features of at least one of the coolant passages being disposed along and in parallel to the at least one electrical terminal such that a length, of a portion, of the at least one of the coolant passages lies along the electrical terminal that is in the shape of a plate. In contrast, Gaia teaches that the hollow portion 36 of fasteners 12 runs between the end bells 14. Accordingly, the hollow portion 36, which serves as a conduit for the passage of fluid coolant is disposed perpendicular to the surface of the end bell 14, for example, in sharp contrast to the features of claim 1.

Accordingly, it is submitted that Gaia fails to teach all the features of claim 1, and that claim 1 defines patentable subject matter.

Claim 20 recites an apparatus for cooling a fuse array mounted between two electrical terminals comprising *at least one coolant passage being attached to each of the electrical terminals such that the coolant passage divides each of the electrical terminals into approximately equally sized regions; and groupings of fuses attached to and disposed respectively intermediate the two electrical terminals in each of the approximately equally sized regions*, thereby interconnecting the electrical terminals.

As noted above, the Office Action asserts that Gaia teaches an apparatus for cooling a fuse array mounted between two electrical terminals comprising two fasteners 12 comprising coolant passages being thermally-conductively attached to each of the electrical terminals 14/16 between fuse columns such that the fasteners with coolant passages divide each of the electrical terminals 14 into approximately equally sized zones; and grouping of fuses 20 attached to and disposed respectively intermediate the two electrical terminals 14/16 in each of the approximately equally sized regions.

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Gaia fails to fairly teach the feature of at least one coolant passage being attached to each of the electrical terminals such that the coolant passage divides each of the electrical terminals into approximately equally sized regions; and groupings of fuses attached to and disposed respectively intermediate the two electrical terminals in each of the approximately equally sized regions, as recited in claim 20. The terminal 16, or even the end bell 14 as asserted in the Office Action, of Gaia is not so divided so as to teach claim 20. Gaia simply teaches that the fastener 12 has a central hollow portion 36 and hence can serve as a conduit for the passage of fluid coolant therethrough; and that once fuse 10 is installed, fluid connections may be made to the ends of mounting means 30, such as, for example, by copper or plastic tubing to carry fluid coolant from a remote source to multiple element fuse 10. Such structure of Gaia does not fairly teach that the coolant passages "divide" each of the electrical terminals into approximately equally sized regions, as recited in claim 20. The coolant passages, for example as shown in Fig. 2 of Gaia account for a very small circular area of the end bells 14. Accordingly, while Applicant appreciates the sense of the assertions in the Office Action, it is submitted that the arrangement of Gaia cannot be fairly interpreted to teach the feature of the *coolant passage divides each of the electrical terminals into approximately equally sized regions*.

However, in order to expedite prosecution of this application, claim 20 is amended to recite further features of the invention. That is, claim 20 is amended to recite "at least one of the coolant passages being disposed along and in parallel to the at least one electrical terminal such that a length, of a portion, of the at least one of the coolant passages lies along the electrical terminal, which is in the shape of a plate." Such claimed features reflect the structure as shown in Fig. 2A of the present application, for example. The coolant passage of

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Gaia is perpendicular to the end bell 14, for example, in sharp contrast to the features of claim 20.

Accordingly, it is respectfully submitted that Gaia also fails to teach or suggest all the features of claim 20.

Further, independent claim 41 defines patentable subject matter for reasons similar to those set forth above with respect to claim 20. That is, unamended claim 41 recites attaching a pair of coolant passages, each shaped to have *two or more roughly parallel lengths*, to each of the electrical terminals along the roughly parallel lengths such that the roughly parallel lengths of each of the coolant passages divide each of the electrical terminals into approximately equally sized regions. These features are not present in the teachings of Gaia. Gaia does not teach a pair of coolant passages, each having the structure as recited in claim 41. Rather, Gaia simply teaches a straight "central hollow portion 36" that provides a coolant passage.

Further, independent claims 23, 42, 43 define patentable subject matter for reasons similar to those set forth above with respect to claims 1, 20 and 41.

Further, the claimed invention provides advantages that are not provided by the applied art. For example, the structure of the invention allowed the present inventors to use commodity device fuses that were optimized for I^2t , in conjunction with allowing such use at a higher RMS current than would normally be expected from such commodity fuses. That is, the invention allowed enhanced use of regular commodity fuses, rather than designing a fuse that had to be specially made to accommodate a water passage, for example.

For at least the above reasons, Applicant respectfully submits that the independent claims define patentable subject matter. The dependent claims, including new claim 47,

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variously depend from the independent claims and therefore also define patentable subject matter for the reasons set forth above with respect to the independent claims, as well as for the additional features such dependent claims recite.

It is respectfully submitted that claims 1-5, 7-8, 13-14, 18-27, 29, 35 and 39-47 define patentable subject matter. Reconsideration and withdrawal of the rejection under 35 U.S.C. §102 is respectfully requested.

B. The 35 U.S.C. §103 Rejection based on Gaia

The Office Action rejects claims 6, 9-12, 15, 28, 30-34, 36 and 37 under 35 U.S.C. §103 as being unpatentable over Gaia. The rejection is respectfully traversed.

The teachings of Gaia are discussed above. It is respectfully submitted that Gaia fails to teach or suggest the features of the corresponding independent claims for the reasons set out above and that the dependent claims further define patentable subject matter for the additional features they recite. Accordingly, withdrawal of the rejection under 35 U.S.C. §103 is respectfully requested.

C. The 35 U.S.C. §103 Rejection based on Gaia and Go

The Office Action rejects claims 17 and 38 under 35 U.S.C. §103 as being unpatentable over Gaia in view of U.S. Patent No. 5,144,531 to Go et al. (Go). The rejection is respectfully traversed.

The Office Action asserts that Gaia teaches all the limitations of the claims except said apparatus further comprises one or more heat exchangers interposed with the one or more coolant passages for cooling the coolant fluid. The Office Action asserts that Go teaches an electronic apparatus liquid cooling system, Fig. 1, comprising a heat exchanger 11 interposed with the coolant passage for cooling the coolant fluid.

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The Office Action further asserts that it would have been obvious to one skilled in the art at the time invention was made to employ a heat exchanger interposed with a coolant passage as it is shown by Go in the device by Gaia in order to enhance the heat dissipation.

Applicant acknowledges that Go teaches the well known use of a heat exchanger. However, it is submitted that even if it were obvious to somehow combine the teachings of Go, and the disclosed heat exchanger, with the apparatus of Gaia, such combination would fully fail to cure the deficiencies of Gaia, as discussed above.

Accordingly, it is respectfully submitted that claims 17 and 38 define patentable subject matter for the reasons discussed above with respect to the corresponding independent claims, as well as for the additional features claims 17 and 38 recite. Withdrawal of the rejection under 35 U.S.C. §103 is respectfully requested.

III. CONCLUSION

For at least the reasons outlined above, Applicant respectfully asserts that the application is in condition for allowance. Favorable reconsideration and prompt allowance of the claims are respectfully solicited.

Should the Examiner believe anything further is desirable in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicant's undersigned representative at the telephone number listed below.

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For any fees due in connection with filing this Response the Commissioner is hereby authorized to charge the undersigned's Deposit Account No. 50-0206.

Respectfully submitted,
HUNTON & WILLIAMS


James R. Miner
Registration No. 40,444

Hunton & Williams
1900 K Street, N.W., Suite 1200
Washington, D.C. 20006-1109
(202) 955-1500

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